

University of Wisconsin’s Outcomes From the Wisconsin Academy for Rural Medicine Track: A Pathway to Rural Primary and Specialty Care

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ABSTRACT

Introduction: The outcomes of the Wisconsin Academy for Rural Medicine (WARM) of the University of Wisconsin School of Medicine and Public Health (UWSMPH) were assessed. Measures included WARM graduates’ practice locations, specialty outcomes, and the influence of program elements on commitment to work with rural populations.

Methods: A review of 106 WARM and 925 non-WARM graduates from 2011 through 2017 was conducted. Stratified chi-square tests of independence and corresponding odds ratios were calculated to examine associations between program type, practice location, and specialty. Exit survey data from graduating WARM students (2020-2023) were analyzed to identify activities perceived as most influential in preparing for rural practice.

Results: WARM graduates had significantly higher odds of practicing in rural areas, in Wisconsin, and in both primary and specialty care compared with non-WARM graduates. Among graduates practicing in Wisconsin, WARM alumni had increased odds of practicing rurally and in primary care. Survey respondents rated interaction with rural physicians and staff as the most important activity for increasing commitment to rural practice.

Conclusions: WARM graduates are substantially more likely than non-WARM graduates to practice in rural Wisconsin, regardless of specialty. Immersive rural experiences, particularly interaction with rural physicians and staff, appear critical in preparing students for rural practice. These findings highlight the effectiveness of rural-focused medical education in addressing physician shortages and improving access to care in underserved communities.

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INTRODUCTION

Within the next 10 years, the United States is expected to experience a shortage of physicians across all specialties and subspecialties.¹ More than 60 million people—about 20% of the US population—live in rural areas. Almost 70% of these areas are designated health professional shortage areas, and this deficit is predicted to get worse as the current population of rural providers ages and retires.^{2,3} Physician shortages limit rural patients’ access to health care, often forcing them to travel far distances to receive services, which further exacerbates health disparities between rural and urban areas.⁴

The 21st century began with a charge to increase the number of physicians working in underserved rural and urban areas within Wisconsin, echoing the national forecast of future physician shortages.⁵ In response, the Wisconsin Hospital Association launched the Wisconsin Task Force on Wisconsin’s Future Physician Workforce, whose deliberations resulted

in a 2004 statewide call-to-action report, “Who Will Care for Our Patients,” highlighting issues and recommendations to respond to existing and predicted workforce shortages.⁵ Recommendations included creating a “school within a school” to address Wisconsin’s rural underserved populations through new admissions and curricular initiatives.⁵ At the time of the task force report, fewer than 5% of graduates of the University of Wisconsin School of Medicine and Public Health (UWSMPH) reported an intention to practice in a rural location, with declining trends over several years. In response, UWSMPH created the

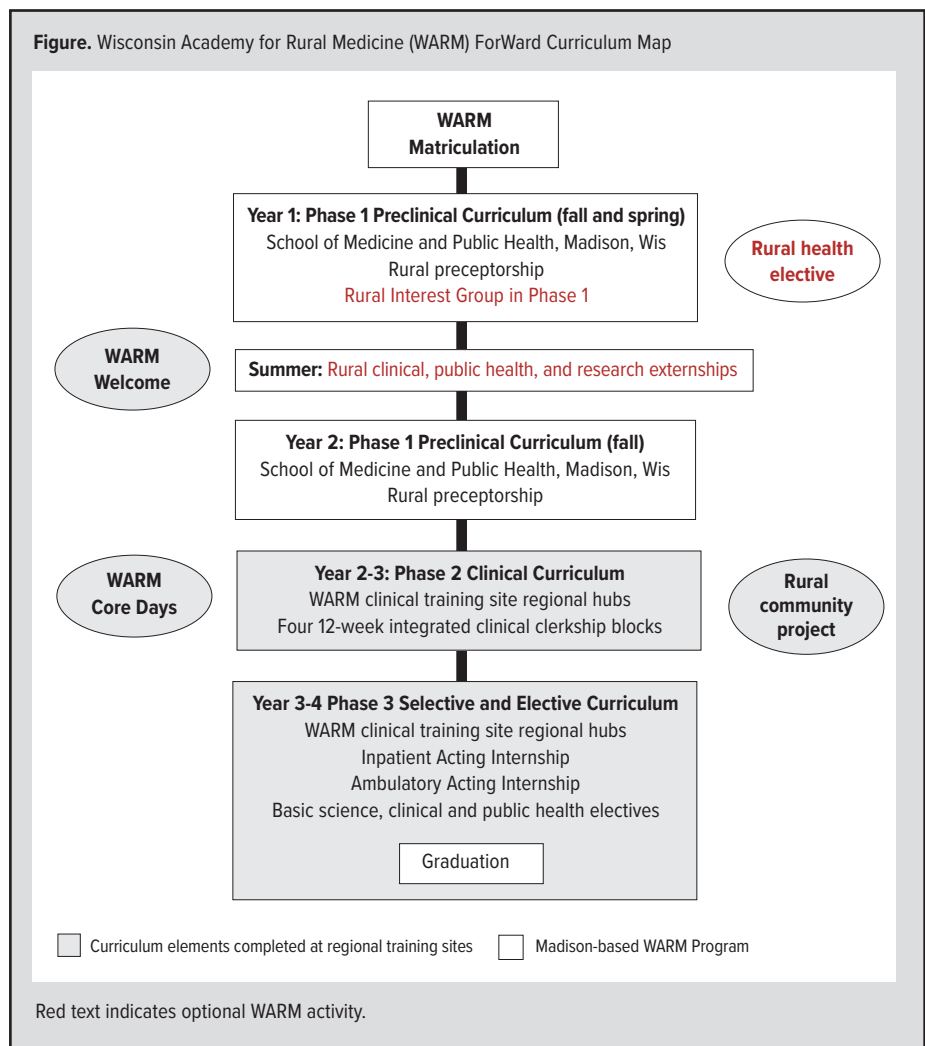
Wisconsin Academy for Rural Medicine (WARM) and matriculated its first cohort of students in 2007.

The goal of the WARM program is to increase the supply of physicians in rural Wisconsin and ultimately improve the health of rural communities. This begins with a selective admission process requiring all applicants to demonstrate dedication to rural medicine and prior immersive rural clinical experiences, while meeting all benchmarks and metrics of the traditional Medical Doctor program's admission criteria. Admission is limited to applicants who are Wisconsin residents or from bordering states (Illinois, Iowa, Minnesota, or Michigan) and can demonstrate a connection to Wisconsin. WARM cohort size has gradually increased and now typically has 26 students per year in each class. Importantly, recognizing shortages of specialists as well as primary care physicians in rural areas, the WARM program is not limited to students interested in primary care careers.

The WARM curriculum follows and enhances UWSMPH's MD curriculum (Figure) and is divided into 3 specific phases. Phase 1 spans the first 18 months of medical school. During this phase, WARM students live and take classes at the UWSMPH campus in Madison, integrating into learning communities with non-WARM students to promote interaction within the school of medicine class and provide rural perspectives to peers. Students also participate in clinical preceptorships in rural communities surrounding Madison to gain rural health care experiences. WARM students may opt to participate in rural enrichment activities, such as the Rural Health Interest Group and the Overview of Rural Health Elective. While optional, almost all WARM students participate in both.

Beginning with Phase 2, all subsequent required clinical experiences occur at 1 of 3 regional clinical WARM sites affiliated with UWSMPH statewide campuses: Marshfield Clinic Health System/Northern Academic Campus in Marshfield, Gundersen Health System/Western Academic Campus in La Crosse, and Advocate Aurora Health/Eastern Academic Campus at Aurora BayCare in Green Bay. These health system hubs serve different rural regions across Wisconsin. WARM students are oriented to their assigned site and community during the summer before their second year in a 1-week program called WARM Welcome, which includes cultural competence education relevant to caring for unique rural

Figure. Wisconsin Academy for Rural Medicine (WARM) ForWard Curriculum Map



populations, such as the Plain Community and Native American tribal communities. Rural physicians who serve as UWSMPH clinical adjunct faculty and public health professionals, in collaboration with these centers, provide highly relevant clinical training equivalent to that provided to non-WARM students in Madison. WARM students have the same core objectives, assessments, and academic standards as their non-WARM counterparts. As part of Phase 2, all UWSMPH students complete community projects, with WARM student projects focusing on the unique health needs of rural communities.

During the last 16 months of medical school (Phase 3), WARM students complete the required inpatient and ambulatory acting internships, working in clinical roles that mimic expectations of interns and prepare them for residency and rural practice. Most WARM students continue working on Phase 2 projects and/or develop new projects to improve the health of the communities in which they learn. Past projects have included naloxone distributions, Stop the Bleed training, and food pantry nutrition education. In addition, during Phases 2 and 3, WARM students participate in Core Days, which gather WARM students to learn new skills, such as wilderness medicine and rural disaster response.

Program evaluation occurs throughout the program using quantitative and qualitative measures to assess outcomes and foster quality improvement. WARM students complete standard evaluations after each clerkship and an end-of-year survey administered each spring. Surveys measure attitudes toward practicing in rural underserved areas and determine the impact and effectiveness of program components.

Extended experiences in a rural setting have been shown to nurture and sustain students' interest in rural practice.⁶⁻⁸ The purpose of this study was to examine WARM program outcomes using 3 measures: (1) WARM graduates' practice locations, focusing on their tendency to practice in Wisconsin—overall and in rural locations—compared to non-WARM peers; (2) WARM graduates' practice specialty outcomes as compared to non-WARM peers; and (3) WARM student ratings of program elements that most influenced their commitment and readiness to work with rural populations.

METHODS

Design

A retrospective review of UWSMPH graduation statistics was conducted. Institutional Review Board (IRB) approval was not sought because this study was determined not to meet criteria for IRB oversight, as it involved quality improvement and program evaluation.

Subjects

To address purposes 1 and 2, we reviewed the verifiable practice location data of 106 of 123 WARM graduates (85.5%) and 925 of 987 non-WARM graduates (94.0%) from 2011 through 2017 who had completed residency training. To address purpose 3, data were collected from fourth-year medical student exit surveys completed from 2020 through 2023 (response rate: 85.3%, n=81).

Variables

Location

Location of current practice as of June 2023 was collected for UWSMPH graduates who had completed all medical training. Data were categorized as practicing in Wisconsin or practicing outside of Wisconsin. ZIP code of current practice location was used to determine the Rural-Urban Commuting Area (RUCA) code. RUCA codes are census tract-based classifications based on population density, urbanization, and commuting patterns that characterize all US census tracts by rural/urban status.⁹ Communities receive a RUCA code scored 1-10, with scores of 4-10 classified as rural. Based on ZIP code and RUCA code, each participant's practice location was categorized as rural or urban.

Specialty

Available graduate practice data included specialty choice, which was categorized as primary care (family medicine or general internal medicine and pediatrics) or specialty care (all other special-

ties). Subspecialties in internal medicine (eg, cardiology, pulmonology) and pediatrics (eg, pediatric emergency medicine) were not included in the primary care category.

WARM Exit Survey

The WARM program administers an exit survey to departing fourth-year students; responses from 2020-2023 were compiled for this study (85.3%, n=81; separate sample from graduate location data). The class of 2020 was the first to experience the UWSMPH's ForWard curriculum, which placed students into clinical rotations statewide a full semester earlier—during their second year—than the previous curriculum. Perceived importance of WARM curricular activities for preparation to be a rural physician was measured with the question, "Rate the importance of the following WARM experiences in increasing your commitment to and readiness for being a rural physician." Graduates rated 4 activities—interacting with physicians and staff in rural areas, interactions with other WARM students, working on a community health improvement project, and living in a rural community—on a scale from 0 (not important) to 3 (very important). Data were also collected for the question, "Please rate the effectiveness of each of these fourth-year requirements in preparing you to work as a rural physician." Graduates rated 2 activities—Inpatient Acting Internship and Ambulatory Acting Internship—on a scale from 0 (not important) to 4 (exceptionally important).

Graduate Data Collection

Graduate records, including specialty, program involvement, and current practice location, are maintained by the Wisconsin Medical Alumni Association (WMAA). Each year, as part of UWSMPH's quality improvement efforts, alumni specialty, employer, and practice location (city and state) listed in the WMAA records for the UWSMPH class that graduated 6 years earlier are verified by the Medical Education Office via Google search so surveys can be sent. For this study, all graduate data from 2011-2017 were reverified and updated via Google search to confirm practice locations and gather ZIP code data.

Analysis

Descriptive statistics were used to compare practice location and specialty between WARM and non-WARM alumni. Stratified chi-square tests of independence and corresponding odds ratios were calculated to test associations between program (WARM vs non-WARM), practice location, rurality, and specialty. Analyses were conducted using SAS Version 9.4 (SAS Institute Inc). Descriptive statistics were also used to summarize perceived importance of WARM experiences in increasing commitment to and readiness for rural practice via self-report.

RESULTS

Descriptive Information

A total of 106 WARM graduates and 925 non-WARM graduates

from UWSPH Classes of 2011-2017 were included in this study. Of the 106 WARM graduates who had completed all training, including residency, 73% (n=77) were practicing in Wisconsin, and 47% (n=36) of this group were practicing in rural Wisconsin (RUCA codes 4-10). In contrast, 39% (n=363) of non-WARM graduates were practicing in Wisconsin, and only 12% (n=43) practiced in rural Wisconsin. Just under half of WARM graduates (46%, n=49/106) were practicing primary care, while one-third of non-WARM graduates (31%, n=289/925) were practicing primary care (Table 1). UWSPH graduate specialties are listed in Tables 2 and 3. Although primary care specialties are the most common among WARM graduates in rural settings, other specialties are also represented in rural practice.

Findings

Graduates of the WARM program have 7.0 times the odds of practicing rurally ($P<.001$), 4.1 times the odds of practicing in Wisconsin ($P<.001$), and 1.9 times the odds of practicing primary care ($P=.002$) compared with non-WARM graduates.

Among the UWSPH graduates practicing in Wisconsin, WARM graduates had 6.5 times the odds of practicing rurally ($P<.001$) and 2.0 times the odds of practicing primary care ($P=.004$). WARM graduates who practice primary care had 12.1 times the odds of practicing rurally ($P<.001$) and 6.3 times the odds of practicing in Wisconsin ($P<.001$) compared with non-WARM graduates. WARM graduates who practice specialty care had 3.3 times the odds of practicing rurally ($P<.001$) and 3.0 times the odds of practicing in Wisconsin compared with non-WARM graduates ($P<.001$).

WARM graduate survey responses from 2020-2023 were reviewed to assess the importance of WARM curricular activities. On average, graduates rated “Interacting with physicians and staff in rural areas” as the most important activity for increasing commitment to and readiness for rural practice (mean, 2.58; SD, 0.71). Graduates rated the Ambulatory Acting Internship (mean, 3.42; SD, 0.72) and the Inpatient Acting Internship (mean, 3.05; SD, 0.93) as very effective in preparing them for rural practice.

DISCUSSION

The goal of the WARM program is to increase the supply of physicians practicing in rural Wisconsin. Results indicate that WARM graduates are significantly more likely to practice rurally and in Wisconsin than non-WARM graduates, suggesting the program has achieved its goal. This is consistent with the application criteria for WARM students, who are selected based on a preexisting desire to work with rural populations and a connection to Wisconsin. These findings align with other rural medical programs, such as Jefferson Medical College Physician Shortage Area Program and University of Illinois Rockford Rural Medical Education Program, which report higher percentages of rural program graduates practicing in rural areas compared with nonrural counterparts.^{10,11}

Table 1. WARM vs Non-WARM Demographics From UWSPH Classes 2011-2017

| | Primary Care | Specialty Care | Practicing in Wisconsin | Practicing in rural Wisconsin |
|------------------|--------------|----------------|-------------------------|-------------------------------|
| WARM (n=106) | 49 (46%) | 57 (54%) | 77 (73%) | 36 (47%) |
| Non-WARM (n=925) | 290 (31%) | 635 (69%) | 363 (39%) | 43 (12%) |

Abbreviations: WARM, Wisconsin Academy for Rural Medicine; UWSPH, University of Wisconsin School of Medicine and Public Health.

Table 2. General vs Specialized Counts of Internal Medicine and Pediatrics for WARM Graduates vs Non-WARM graduates From UWSPH Classes 2011-2017

| | All Graduates | WARM Graduates | Non-WARM Graduates |
|-------------------|---------------|----------------|--------------------|
| Internal Medicine | 182 | 14 | 168 |
| General | 106 (58%) | 7 (50%) | 99 (59%) |
| Subspecialty | 76 (42%) | 7 (50%) | 69 (41%) |
| Pediatrics | 108 | 4 | 104 |
| General | 68 (63%) | 2 (50%) | 66 (63%) |
| Subspecialty | 40 (37%) | 2 (50%) | 38 (37%) |

Abbreviations: WARM, Wisconsin Academy for Rural Medicine; UWSPH, University of Wisconsin School of Medicine and Public Health.

A key outcome— independent of specialty choice—is that WARM graduates have higher odds of practicing in rural areas and in Wisconsin. While many rural programs emphasize primary care, WARM allows students to pursue any specialty.¹²⁻¹⁴ This is important because specialized physicians are less likely to practice in a rural area.¹⁵ We theorize that because WARM students do not need to declare a specialty before admission, their preference for rural practice outweighs the assumption that specialty care is limited to urban settings. As rural providers retire across all specialties, rural programs that do not restrict specialty choice may better meet community needs, which extend beyond primary care.

According to WARM students, one of the most important factors in preparing students for rural practice is experience with physicians and staff in rural settings. Research supports that rural clinical placements positively influence rural practice location.¹⁶ These interactions with rural community members allow students to envision their future careers and foster longitudinal relationships. This likely explains why students rated the Ambulatory Acting Internship highly, along with other continuity-based experiences in rural training sites. Therefore, rural tracks should maximize rural immersion, so students graduate feeling prepared and connected to rural communities.

Limitations

This study has limitations. Rurality was determined by RUCA codes, which are based on commuting patterns; thus, small towns with a high percentage of people who commute to a urban centers for work may not have a rural classification, potentially underestimating rural status and the true breadth of UWSPH

Table 3. Number and Percentage of WARM and Non-WARM Graduates From UWSPH Classes 2011-2017 Practicing in Each Specialty

| Specialty | WARM Total | WARM Wisconsin | WARM Rural WI | WARM Urban WI | Non-WARM Total | Non-WARM Wisconsin | Non-WARM Rural WI | Non-WARM Urban WI |
|----------------------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|-------------------|-------------------|
| Anesthesiology | 5 (4.7%) | 2 (2.6%) | 0 (0%) | 2 (100%) | 68 (7.4%) | 23 (6.3%) | 2 (8.7%) | 21 (91.3%) |
| Dermatology | 1 (.9%) | 1 (1.3%) | 1 (100%) | 0 (0%) | 19 (2.1%) | 9 (2.5%) | 1 (11.1%) | 8 (88.9%) |
| Diagnostic radiology | 3 (2.8%) | 2 (2.6%) | 0 (0%) | 2 (100%) | 35 (3.8%) | 18 (5.0%) | 0 (0%) | 18 (100%) |
| Emergency medicine | 10 (9.4%) | 5 (6.5%) | 0 (0%) | 5 (100%) | 90 (9.7%) | 32 (8.8%) | 9 (28.1%) | 23 (71.9%) |
| Family medicine | 40 (37.7%) | 33 (42.9%) | 22 (66.7%) | 11 (33.3%) | 125 (13.5%) | 68 (18.7%) | 13 (19.1%) | 55 (80.9%) |
| General surgery | 9 (8.5%) | 7 (9.1%) | 4 (57.1%) | 3 (42.9%) | 64 (6.9%) | 25 (6.9%) | 1 (4.0%) | 24 (96.0%) |
| Internal medicine | 14 (13.2%) | 10 (13%) | 4 (40%) | 6 (60%) | 168 (18.2%) | 57 (15.7%) | 3 (5.3%) | 54 (94.7%) |
| Neurology | 2 (1.9%) | 1 (1.3%) | 0 (0%) | 1 (100%) | 8 (.9%) | 2 (.6%) | 0 (0%) | 2 (100%) |
| Obstetrics/gynecology | 3 (2.8%) | 3 (3.9%) | 2 (66.7%) | 1 (33.3%) | 59 (6.4%) | 20 (5.5%) | 2 (10%) | 18 (90.0%) |
| Ophthalmology | 1 (.9%) | 0 (0%) | 0 (0%) | 0 (0%) | 13 (1.4%) | 6 (1.7%) | 1 (16.7%) | 5 (83.3%) |
| Orthopedic surgery | 3 (2.8%) | 2 (2.6%) | 0 (0%) | 2 (100%) | 44 (4.8%) | 22 (6.1%) | 5 (22.7%) | 17 (77.3%) |
| Otolaryngology | 1 (.9%) | 1 (1.3%) | 0 (0%) | 1 (100%) | 19 (2.1%) | 9 (2.5%) | 0 (0%) | 9 (100%) |
| Pathology | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 11 (1.2%) | 5 (1.4%) | 1 (20%) | 4 (80%) |
| Pediatrics | 4 (3.8%) | 2 (2.6%) | 1 (50%) | 1 (50%) | 104 (11.2%) | 36 (9.9%) | 2 (5.6%) | 34 (94.4%) |
| Physical medicine/rehabilitation | 2 (1.9%) | 2 (2.6%) | 1 (50%) | 1 (50%) | 3 (.3%) | 0 (0%) | 0 (0%) | 0 (0%) |
| Psychiatry | 6 (5.7%) | 4 (5.2%) | 0 (0%) | 4 (100%) | 41 (4.4%) | 14 (3.9%) | 0 (0%) | 14 (100%) |
| Urology | 2 (1.9%) | 2 (2.6%) | 1 (50%) | 1 (50%) | 6 (.6%) | 4 (1.1%) | 1 (25%) | 3 (75%) |
| Other | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 48 (5.2%) | 13 (3.6%) | 2 (15.4%) | 11 (84.6%) |
| Total | 106 | 77 | 36 | 41 | 925 | 363 | 43 | 333 |

Abbreviations: WARM, Wisconsin Academy for Rural Medicine

All subspecialties are included within the specialty (ie, cardiology is included in internal medicine total). Total and Wisconsin column percentage represents part of total amount, respectively. Rural and urban column percentages represent percent of Wisconsin total in rural and urban setting.

Rural=Rural-Urban Commuting Area (RUCA) code 4-10; urban=RUCA code 1-3.

Bold type indicates primary care specialties.

graduates in rural practice. Furthermore, this study could not assess outreach activities; for example, physicians based primarily in urban health system hubs may regularly serve rural satellite clinic(s). Therefore, the number of WARM graduates serving rural populations may be higher than this study demonstrates. Additionally, survey data did not coincide with the same time period as the graduate data, so WARM graduates currently in practice may feel that different program elements influenced their decision to practice rurally. Practice location was collected as of June of 2023, representing varying lengths of practice and not accounting for provider movement. Finally, although data were available for nearly all graduates (92.9%), results might differ if all graduates were included.

Despite these limitations, these findings have valuable implications. Including a rural program within a medical school is highly beneficial, as this study and others^{12,17,18} demonstrate the impact of dedicated rural-focused education and mentorship. Proportionally, significantly more WARM graduates than non-WARM graduates practice rurally and in Wisconsin. At a time of increasing physician shortages widening health disparities, programs that successfully place providers within the state where they train are beneficial. Future research should explore WARM graduates' perceptions after entering practice and examine whether WARM graduates in urban settings provide more

rural outreach than non-WARM graduates. Additionally, studies could assess whether WARM graduates have greater longevity in rural practice compared with physicians without dedicated rural medical education.

CONCLUSIONS

The Wisconsin Academy for Rural Medicine (WARM) program demonstrates significant success in addressing physician shortages in rural Wisconsin. WARM graduates are substantially more likely than non-WARM graduates to practice in rural areas and within the state, regardless of specialty choice. These findings underscore the value of rural-focused medical education and immersive experiences in fostering long-term commitment to rural practice. As physician shortages continue to threaten access to care, programs like WARM provide an effective model for increasing the rural physician workforce and improving health equity in underserved communities.

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